

Science Plan for a Potential 2008 Experimental Beach/Habitat-Building Flow

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December 5, 2007

Overview

- **Review major elements of the Beach Habitat Building Flow (BHBF) Science Plan**
 - Background, purpose, and scope
 - Results of past BHBF tests
 - Science questions addressed
 - Timing, duration, and magnitude
 - Costs
 - Long-Term Experimental Strategy
 - Experimental Study Plans

Final TWG Review

October 5, 2007

The TWG considers that the GCMRC's BHBF Science Plan to be technically adequate and recommends that AMWG accept the plan, but that AMWG consider the following issues in relation to priorities and budgeting:

- Sandbar and nearshore habitat responses
- Assessment of nearshore and food base responses
- Native and nonnative fish movement and population responses to the BHBF and in relation to changing thermal conditions, where seasonally appropriate, and in relation to the adequacy of overall HBC monitoring
- A comprehensive economic analysis of BHBF costs and impacts
- Integration of past BHBF and related ecosystem information into overall ecosystem structure and function...

TWG recognizes that the BHBF Science Plan should be evaluated from a policy standpoint by the AMWG.

Yes: 13; No: 7

Review/Decision Making Process

- **Agency & Peer Review of Science Plan (Feb-Apr 2007)**
 - BOR, NPS, FWS, WAPA, and AGFD preliminary review
 - Independent Science Advisor review
- **TWG Review of Science Plan (May-Oct 2007)**
- **DOI/AMWG Policy Review (Nov 2007 to present)**
 - Revise Plan based on TWG/AMWG concerns
- **DOI Decision Timeline**
 - Dec 3-7: Formal DOI proposal? GCMRC spending authorized?
 - Dec 10-12: Final BHBF Science Plan
 - Dec 07 – Feb 08: Compliance and permitting
 - Mid Feb 08: Final DOI Decision

Why Sand?

86% reduction from predam sand levels

Importance of Sandbars

- Aquatic Habitats – nursery habitats for native fish
- Terrestrial Habitat – substrate for riparian vegetation
- Archaeological Site Preservation – most archaeological sites buried in sand/silt
- Recreational Campsites



Purpose and Scope

- **Purpose:** Build upon existing scientific knowledge to inform managers about the efficacy of using BHBF testing to rebuild not only sandbars, but also benefit various resources, particularly humpback chub.
- **Scope:** Addresses strategic science questions in the Monitoring and Research Plan (MRP) and builds on ongoing monitoring and research efforts



Results of Past BHBF Tests

- **1996 BHBF Test—depleted sand conditions**
 - Sand does not accumulate in the riverbed over multiyear period under normal dam operations
 - When BHBF occurs under depleted sand conditions, sandbars erode
- **2004 BHBF Test—moderately enriched sand conditions**
 - Increase in sandbars in Marble Canyon; net loss of sand in eddies downstream
 - Increases in eddy-sandbar area are only possible under enriched conditions;
 - Sand from newly created bars may help protect archaeological sites

Humpback Chub Response

- **1996 BHBF Test: Valdez et al (2001)**
 - No decrease in HBC or other natives
 - Temporary displacement of nonnatives
- **Evaluation of 2004 test confounded by post BHBF flood from LCR**
- **HBC stock assessment (Coggins, 2007) suggests:**
 - BHBF did not adversely affect HBC
 - HBC adult population increased in 2004-05 following BHBF
 - HBC recruitment increased in 1996 and 2004

Best Timing

For 2008, March is earliest practical time given logistical, administrative, and safety constraints

March 2008 offers several advantages:

- Beginning of historic natural flood cycle
- System is sand enriched – 2-3 times 2004 levels
 - Sand supply will erode over time although slowly under current flows
- Immediately before spawning season--backwaters will be available for native fish in spring and summer
- Minimizes impact on food base and trout condition
- Prior to tamarisk flowering
- Immediately before windy season – sand bars will contribute to archaeological site protection

Concern: Trout fishing economic impact (prefer late Jan/early Feb)

Peak Flow Magnitude and Duration

Replicate 2004 hydrograph

- 41,500 cfs for 60 hours

Precede and follow test with normal dam operations i.e., modified low fluctuating flows

Important Differences:

- 2-3 times more sand; more evenly distributed
- Normal MLFF flows will follow the test



Strategic Science Questions

- Based on AMWG concerns and AMP Goals



- Tier off strategic science questions in MRP
- Primary focus on sediment and humpback chub (backwaters habitats)

Sediment Science Questions

Strategic Science Question: Is there a “flow-only” operation that will rebuild and maintain sandbar habitats over decadal timescales?

BHBF Science Questions

1. How does suspended sediment concentration and grain size vary through time and by reach under more enriched sand supplies; Is the net mass balance of sand following the BHBF test net positive, negative, or neutral?
2. What is the minimum duration for BHBF tests needed to build and maintain sandbars under sand enrichment?
3. Can the next BHBF test increase campable areas at sandbars on a sustainable basis?
4. How do post-BHBF flows affect the persistence of sandbars and related backwater habitats used by humpback chub and other fishes?

Humpback Chub Questions

Strategic science question: How important are backwaters and vegetated shoreline habitats to the overall growth and survival of young-of-year and juvenile native fish?

BHBF science question

- Do BHBF tests result in creation of backwater habitats that may offer physical benefits to humpback chub and other native fishes?
- To what extent are backwater habitats created by a BHBF used by humpback chub and other native fishes?

Cultural Resource Questions

- **Strategic science question:** How effective are various treatments in slowing rates of erosion at archaeological sites over the long term?

BHBF science questions

1. Do sandbars deposited by BHBF tests contribute to preservation of archaeological sites in the river corridor?

Other Priority Questions

- **Strategic science question:** How is invertebrate flux affected by water quality and dam operations?
- **BHBF science question:** How will a future BHBF test affect food production and availability?
 - Impact rainbow trout in the Lees Ferry reach?
 - Impact native fishes?

Other Priority Questions

Strategic science question: Do dam controlled flows affect rates of erosion and vegetation growth at archaeological sites and TCP sites, and if so, how?

BHBF science question

- Are open patches more susceptible to exotic species colonization and establishment than sites with existing vegetation following a disturbance?

Other Priority Questions

- **Lake Powell:** Will a BHBF result in higher nutrient releases and shrinking of the hypolimnion?

BHBF Science Costs

- Estimated cost is over 2 years

- Year 1: \$1.64

- Year 2: \$0.50

Total: \$2.1 million

Option to reduce cost by funding a portion of proposed studies

- Available Funds (Experimental Fund only)

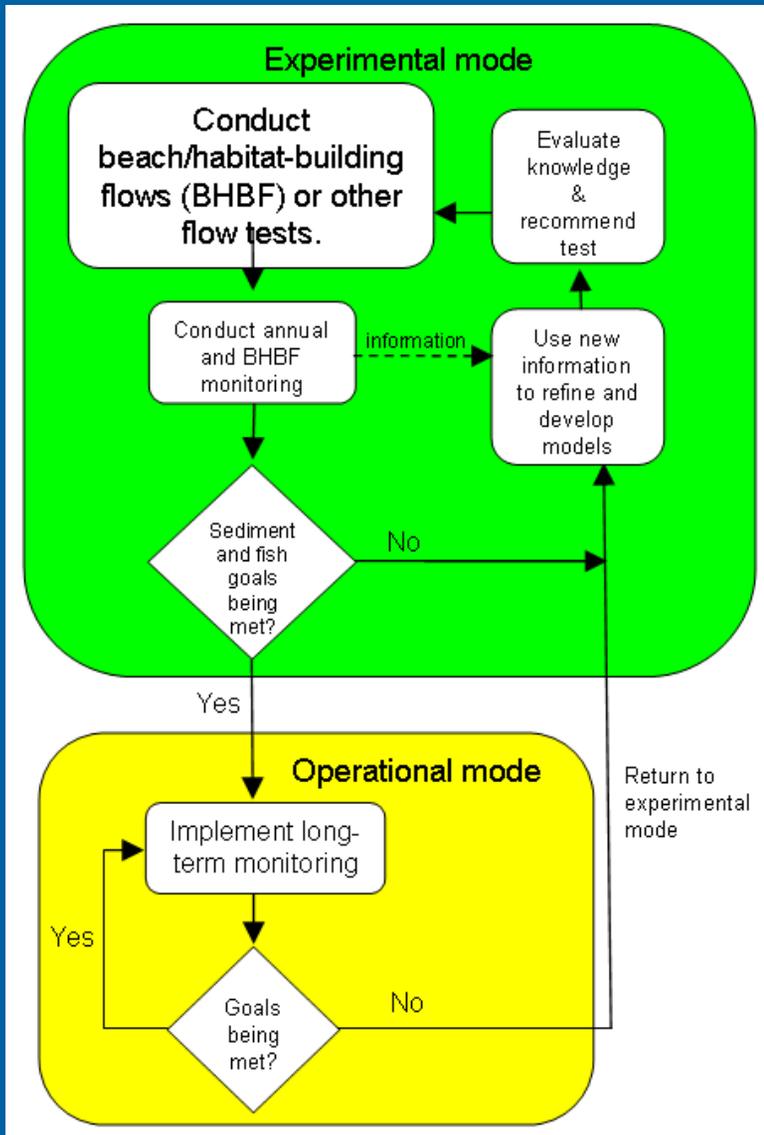
- FY 08: \$1.45 million

- FY 09: \$.50 million

Total: \$1.95 Million

- Outside AMP funds may be available

Long-Term BHBF Strategy



At least several more BHBF tests will be required to assess effectiveness:

- Sand supplies are limited
- BHBF tests are inefficient
- Intervening flows export sand
- Long term effectiveness can only be determined based on cumulative effects of multiple tests
- Need to evaluate effectiveness under range of different flow regimes and natural conditions

Modeling may reduce the number of tests and costs

Questions/Comments



**Sandbar Response from 2004 BHBF Test
(upper Marble Canyon)**